



# Incorporating Lessons Learned in the PIP-II Project

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In partnership with:  
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## About Me

- Jemila Adetunji – QA Manager
  - 15+ years working in various quality-related roles
    - 9 years in Consumer Goods and Manufacturing/Operations
      - Quality Management / ISO Program Maintenance
      - Quality Assurance / Quality Control
      - Consumer Quality
      - Supply Chain
    - 3.5 years in Technological Services
      - Quality Assurance / ISO Program Implementation & Maint.
      - Quality Planning for Business Processes & Projects
    - 4.8 years at Fermilab
      - Quality Management: Fermilab QA and ESH&Q Training Department Head
      - Project Quality : UUP QA Manager, Mu2e QA Manager, General 413 Project Quality Support

# What is a Lessons Learned?

As per the Fermilab Quality Assurance Manual (QAM) Chapter 12010 – *Fermilab Lessons Learned Program and Procedures*, a ‘lesson learned’ is “a best practice that is captured and shared to promote repeat application or an adverse work practice or experience that is captured and shared to prevent recurrence”.

# Why Is Lessons Learned Important?

Instituting a process to capture, evaluate, and implement lessons learned, enables the Project to effectively evaluate past experiences and determine what is needed to prevent repeating mistakes or just to perform more effectively.

## PIP-II Lessons Learned Process

- PIP-II will evaluate lessons learned from various projects, laboratories, programs, as well as internally (within the Project, including from Partners) to determine opportunities to improve and strengthen the Project.
- The goal is to promote desirable outcomes, prevent unwanted outcomes, and minimize the impact of the consequences to unwanted outcomes.
- It is imperative for the project to establish clear and effective lines of communication between Partners for transparency and the reciprocity of information.

# Inputs to the Lessons Learned Process

- Best Practices
- Nonconformances or Opportunities for Improvement
- Nonconformances at Partners/Vendors/Subcontractors
- Process Breakdowns/Gaps
- Safety Incidents / Near Misses
- Safety-By-Design Implementation
- Cost Savings
- Other Projects' issues, opportunities, and lessons learned
- Formal Project Reviews
- Internal Project Reviews
- Assessments/Effectiveness Reviews
- DOE [OPEXShare](#)

# How will the Project Gather the Inputs?

- PIP-II will
  - Review and monitor the Nonconformance Report (NCR) Log in existing forums (e.g. Technical Integration Team Meetings)
    - Root cause analysis will be conducted on NC's to understand failure and corresponding corrective action plans. *NOTE: The Lessons Learned process is inherently linked to corrective action/preventive action planning.*
  - review final reports from Project Reviews (internal and external);
  - identify lessons learned from internal forums such as Project Oversight Group (POG) Mtgs., Project Management Group (PMG) Mtgs., Integrated Project Team (IPT) Mtgs.
  - capture NCRs from Partners and Vendors/Subcontractors which will be logged, reviewed, and discussed;
  - review issues/incidents from other Projects;
  - identify and discuss what is working well; and
  - conduct assessments such as effectiveness reviews

# Initial Analysis

- Once data has been gathered from inputs, the Project must proactively analyze the best practice, incident, process gap, or nonconformance to understand the root causes or conditions and the next steps.
- Benefit Analysis (Questions to answer/discuss):
  - Is the lessons learned informational only?
  - Has this previously occurred or previously identified?
  - Can this happen again (or to us) if no changes are made?
  - What other areas of the project could be impacted?
  - What can we learn from this?
  - How can this benefit us?
  - Is this applicable to other areas of the Project? to Partners?
  - Could this be applicable to other Projects?
- Would the incorporation (or non-incorporation) of the lessons learned change the Project's Risk Profile?
- Is this a viable lessons learned for the Project?
- Is this a critical lessons learned for the Project?
- Consensus is required from established forum and decisions will be documented.

## Further Analysis

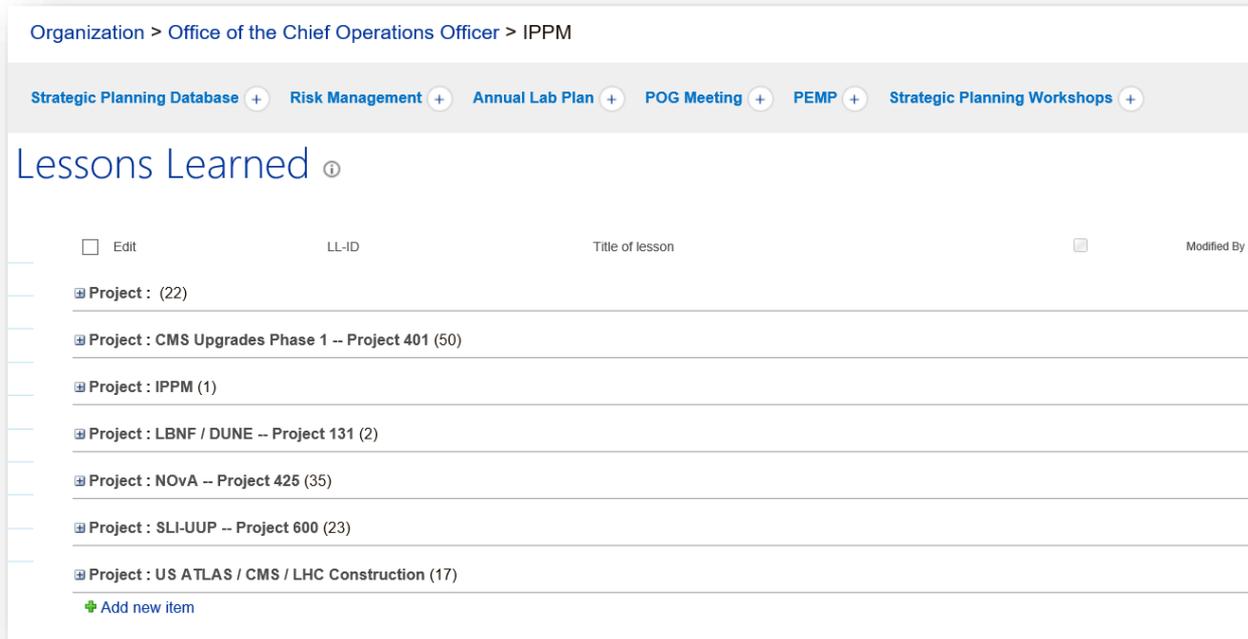
- If the Project identifies a lessons learned to be informational only, then documentation and dissemination should occur without further analysis.
- If the Project identifies a lessons learned should be implemented, then the next step would be to understand the impact and resources required; then communicate to stakeholders and seek approval.
- A high-level impact analysis would be required which would include answers to the following questions:
  - Would the incorporation of the lessons learned result in a major change (i.e. budget, scope, schedule, technology)?
  - Would the incorporation of the lessons learned require additional resources at FNAL or at Partners?
  - Would the incorporation of the lessons learned require process or tool changes?

## Decisions / Approvals

- If the impact analysis results in a ‘major change’ (*to be defined by some threshold*), then the item will be reviewed by the Change Control Board where approval would be required by the Project Director.
- If the impact analysis results in a ‘minor change’ (*to be defined by some threshold*), then approval would be needed by Systems Managers and Technical Integration Team.

# Documentation & Dissemination

- PIP-II will use the Office of Integrated Planning & Performance (IPPM) Lessons Learned Database to capture Lessons Learned. This database can also be used to mine lessons learned from other Fermilab Projects.



Organization > Office of the Chief Operations Officer > IPPM

Strategic Planning Database + Risk Management + Annual Lab Plan + POG Meeting + PEMP + Strategic Planning Workshops +

## Lessons Learned ⓘ

<input type="checkbox"/> Edit	LL-ID	Title of lesson	<input type="checkbox"/>	Modified By
Project : (22)				
Project : CMS Upgrades Phase 1 -- Project 401 (50)				
Project : IPPM (1)				
Project : LBNF / DUNE -- Project 131 (2)				
Project : NOvA -- Project 425 (35)				
Project : SLI-UUP -- Project 600 (23)				
Project : US ATLAS / CMS / LHC Construction (17)				
<a href="#">+ Add new item</a>				

- A summary of the lessons learned will be reviewed in the standing L2/L3 meetings to ensure dissemination of information to all levels in the Project.
- Lessons Learned is a permanent topic discussed on the PIP-II Project Executive Board Agenda.

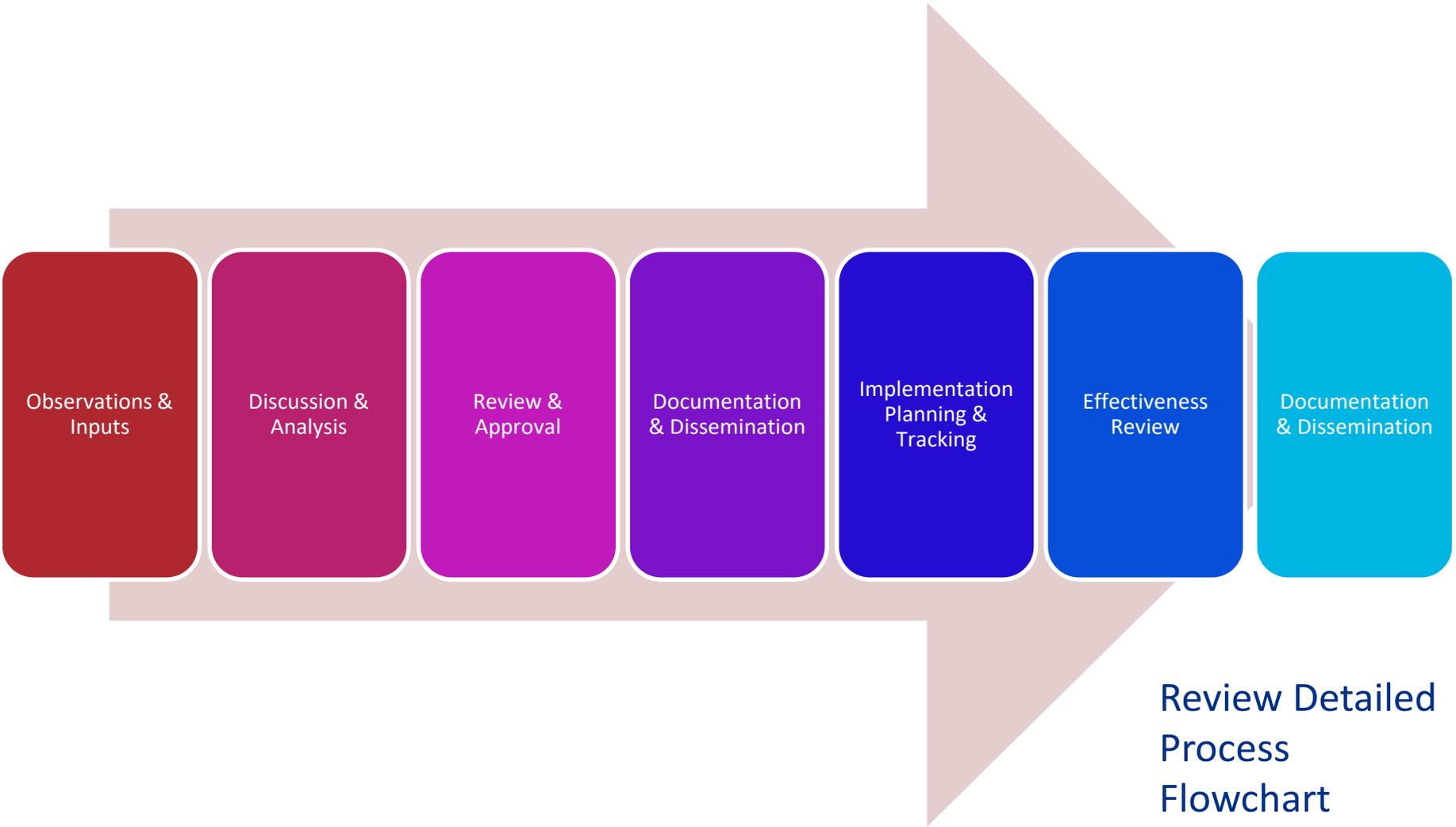
# Implementation Planning & Tracking

- A critical aspect of the lessons learned process is implementation.
- If the Project decides to move forward with the incorporation of the lessons learned via approval by required stakeholders, then an implementation plan would be required.
- The implementation plan would include:
  - Description of the lessons learned
  - Description of the changes/impact/benefit
  - Detailed Action Plan
  - Person(s) responsible for the implementation
  - Timeline/Due Dates
- This implementation plan will be documented and tracked in iTrack (FNAL Issues Management Database) and linked to the IPPM LL Database.

# Effectiveness Reviews

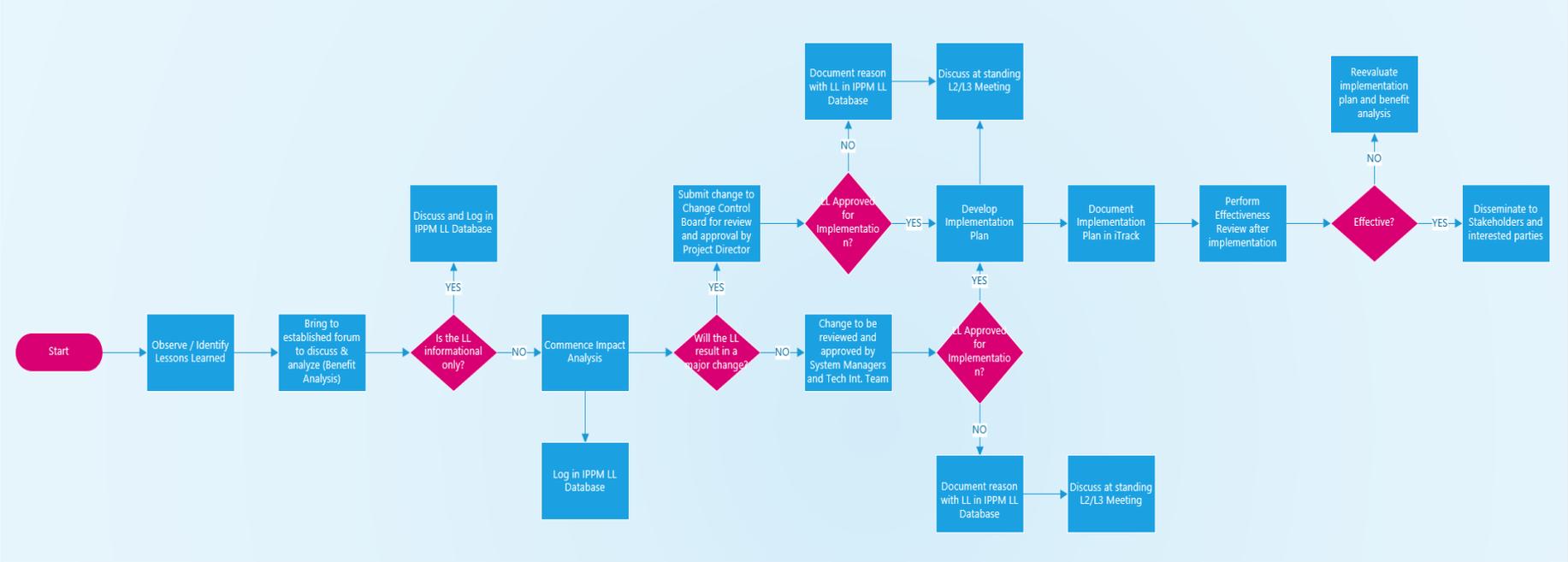
- After implementation, an effectiveness review must be performed to verify implementation and impact.
- If the implementation has been deemed ineffective or incomplete by the due date, then the plan will be reanalyzed and the value of the implementation will be revisited.
- If the implementation has been deemed effective, then the appropriate documentation in iTrack is required along with subsequent communication to stakeholders and interested parties.

# Recap: PIP-II Lessons Learned Approach



Review Detailed  
Process  
Flowchart

# Lessons Learned Process



# Examples of Lessons Learned

- Project Management
  - Lessons Learned from ESS (relating to in-kind contributions):
    - PIP-II is establishing governing documents and templates; as well as technical and advisory boards.
- Procurement
  - Lessons Learned from LBNF:
    - PIP-II is engaged in weekly meetings with Procurement.
    - PIP-II will have dedicated Procurement staff.
- Conventional Facilities
  - Lessons Learned from LCLS-II and SBN:
    - PIP-II will develop and implement Critical Lift Plans
  - Lessons Learned from internal Fermilab process improvements:
    - PIP-II will ensure consistency with lab processes for equipment selection

# Examples of Lessons Learned

- Transportation
  - Lessons Learned from LCLS-II:
    - PIP-II has included Transportation Readiness Reviews to the PIP-II Review Process as documented in the *PIP-II Review Plan* document.
    - PIP-II is evaluating two 650 cryomodule types with respect to transportation, and based on the analysis, the Project will decide which method to adopt.
  - Lessons Learned from other Projects:
    - PIP-II will add a Logistics Manager to the team to manage Transportation Plans and deliveries to Fermilab.
    - The Logistics Manager will work collaboratively with the lab's Import/Export Compliance Manager.
- Accelerator Complex Upgrades
  - Lessons Learned from Fermilab Projects:
    - The PIP-II beam dump design has been improved by the elimination of materials that can corrode and lead to water leaks and failures; also ensuring the beam absorber can be safely serviced and removed.

# Examples of Lessons Learned

- Linac Installation & Commissioning
  - Lessons Learned from PIP2IT:
    - PIP-II will ensure processes include the confirmation that machine protection features are fully implemented and tested at the subsystem level prior to the hand-off to operations.
- RF Distribution
  - Lessons Learned from PIP2IT:
    - PIP-II will have explicit requirements for RF power amplifier controls logic and require evidence of compliance.
- Quality Assurance
  - Lesson Learned from LCLS-II:
    - PIP-II will add dedicated quality resources to L2 Systems, starting with the SRF & Cryo Systems.

## Next Steps

- Define thresholds for ‘major’ and ‘minor’ changes.
- Socialize this approach to incorporate lessons learned with Partners.
- Collaborate with Partners to establish the methods for the consistent identification and communication of lessons learned is agreed upon and understood (reciprocity).
- The Project Planning Documents (PPD) with the Partners will include respective QA Plans which includes the Lessons Learned process.

# Summary

- PIP-II is implementing a lessons learned process that will foster the collaborative efforts with Partners.
- The process will enable formal evaluation of inputs from various sources, including from Partners, to determine the most useful application for the PIP-II Project.
- Thank you for your time and attention!